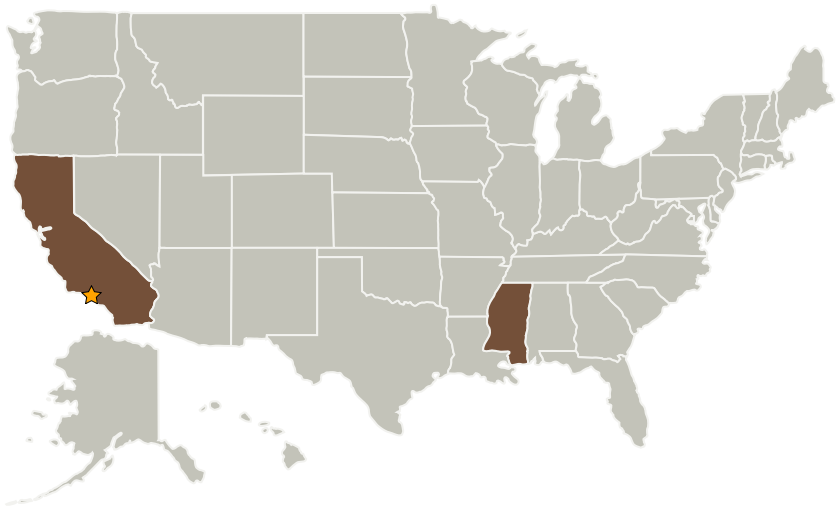
500?C SiC JFET Driver Circuits and Packaging, Phase I

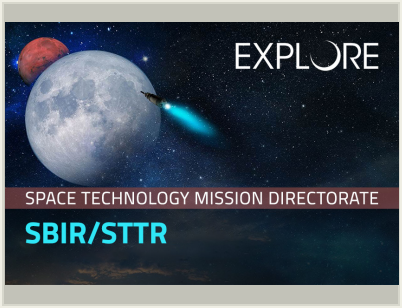
Completed Technology Project (2005 - 2005)

Project Introduction

In the proposed development, SiC JFET control circuitry and normally-off SiC JFET power switch will be integrated in a single SiC chip that will provide digital output for driving piezoelectric, electrostatic, or electromagnetic actuators. Innovative device design, metallurgical ohmic contact and die attach development, and coordinated packaging approaches will result in SiC power I.C. technology capable of sustained operation at 465?C, an industry first. This development will result in a unique lightweight, low-cost, packaged all-SiC Smart Power Module able to reliably operate in extremely high temperature, pressure, and radiation environments. Silicon carbide active components (vertical SemiSouth SiC power transistors) will be evaluated for 465C ambient operation. Improvements in the metallurgical ohmic contacts, die attach, wire bond, and package will be investigated to extend the reliable operating temperature range. Additionally, passive components such as thick film resistors, NPO and diamond capacitors, will be investigated as well. Finally, all of this information will be used to develop compact device and circuit models to propose a complete packaged commercial solution for 500C capable SiC based driver circuits.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
SemiSouth Laboratories, Inc	Supporting Organization	Industry	Starkville, Mississippi

Primary U.S. Work Locations	
California	Mississippi

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jeffrey Casady

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.1 Avionics Component Technologies
    - TX02.1.6 Radiation Hardened ASIC Technologies